Dear Editor-in-Chief;

I would like to express my sincere gratitude for your kind consideration and assistance in reviewing our manuscript for possible publication in the Energy Journal. I am pleased to submit the revised manuscript, which takes into account all the comments and recommendations provided by the respective editor and the reviewers. Their invaluable feedback has greatly helped us improve the quality of the manuscript. Therefore, I appreciate the time and effort they invested in reviewing our work. Please note that the blue-colored text indicates our responses to the reviewers' comments, while the red-colored text denotes the revised or added sections in the manuscript. Also, the added sections in the manuscript are highlighted in yellow.

Kinds regards,

Arman Eskandarzadeh

Reviewer #1

The revised version of the paper addressed most of the comments of reviewer #1 adequately. However, some major concerns were raised by the other reviewers. The response on these concerns seems reasonable, but have to be checked by the other reviewers carefully to make a final decision. Although major concerns were mentioned by the other reviewers, the authors have left some open questions on the reviewer comments of reviewer #1:

--> There are still some grammar errors in the manuscript. Language check is definitely needed.

- ✓ Thank you very much for your comment. We checked again the manuscript and revised the unclear sentences and syntax errors. Some of these selected cases are as follows:

hence, researching several multigenerational systems with diverse configurations is essential in terms of energy, efficiency, and economics.

The energy and exergy studies of each component in such systems are strongly advised to shed additional light on the subject. Calculating the heat transfer of heat exchangers between the energy production unit and the absorption refrigerant cycle or between the gas engine and the greenhouse atmosphere has a significant impact on the development of the model.

Most academics try to use techniques to absorb pollutants like carbon dioxide and methane generated in this setting [1].

Taking advantage of the carbon dioxide generated in greenhouse environments for plant photosynthesis is one of the most common strategies

According to the effects of renewable energy, natural gas is the most environmentally friendly fossil fuel

Greenhouse crops are often grown using the heat and carbon dioxide that energy systems create

Consequently, both the lightning process and other system components should be represented

Calculating the heat transfer of heat exchangers between the energy production unit and the absorption refrigerant cycle or between the gas engine and the greenhouse atmosphere significantly impacts the model's development

Consequently, both the lightning process and other system components should be represented

In such a system, energy and cost analyses are done while simulating a molten carbonate fuel cell.

In this context, an integrated system with a carbon dioxide extract and storage unit, an Organic Rankine Cycle, and a chiller cycle may be evaluated from the standpoints of energy, efficiency, the economy, and the environment

Additionally, phycocapture, which may be considered a carbon sink in metropolitan areas, is a unique way to reduce or capture carbon dioxide because greenhouse gases like carbon dioxide might profoundly affect many aspects of human existence

The system, illustrated in Error: Reference source not found consists of a Brayton cycle, an Organic Rankine cycle, a greenhouse, an air conditioning system and chiller cycle, and will be evaluated as part of the project.

So, by supplying the necessary standard carbon dioxide, the suggested method has the potential to lower air pollution and enhance greenhouse products. Watermelon and tomatoes are two of the plants planted in the greenhouse.

As a result, the expelled exhaust at point 10 transfers to a different heat exchanger, where it heats the Organic Rankine cycle fluid before leaving at point 11.

The gases resulting from combustion have a high temperature, their pressure is low, and the concentration of carbon dioxide is low.

The adsorption process can lower the energy and financial costs associated with CO2 separation from the flue. Generally, the CO2 adsorbent has to be highly selective, have a large adsorption capacity, have acceptable adsorption or desorption kinetics, and have strong thermal and mechanical stability.

Then exits a liquid expansion valve, and until it reaches point 27, its enthalpy and pressure are decreasing. The refrigerant enters point 23 as a saturated liquid after passing through a heat exchanger to condense and descend its energy.

Thus, a backup light source from an artificial source, such as LED lighting, should be considered.

A greenhouse's lighting system must be designed economically. Each lamp's optimum illuminating area for optimal plant development is noted on the packaging as A_{lamp} [53].

The following equation yields an evaluation of carbon dioxide capture from gas engines or decreased carbon dioxide in the environment:

On the other hand, scaling the data does not always lead to perfect precision, and during the scaling process, mistakes might be made due to several sequences and details.

The influence of greenhouse length on the model functions was assessed

and is depicted in Figure 2 since the construction of the greenhouse and its dimensions are among the primary goals of the current article.

Since greenhouse production is taken into account while calculating yearly income since more items would be produced yearly with a larger greenhouse, the annual interest would be more than the costs and the annual net interest would rise as the greenhouse's length increased.

When the compression ratio is at a high level, the output power needed by the gas turbine will grow, and when it is low, the output power of the GT will drop.

Error: Reference source not found also includes the quantity of inputs, the relevant ranges, and the justification for every solution variable restriction.

- ✓ In addition to benefiting greenhouse goods and cleaning the environment, using greenhouses to absorb carbon dioxide also generates economic benefits due to the release of penalties.

--> "Section 2, paragraph 2, line 14: Before CO2 enters the greenhouse at point 13 CO2 separation procedures are applied. Please describe the procedure! Because the used procedure has also a significant impact on the energetic performance." The authors did not make any comments on the adsorption process (e.g. adsorbent used, selectivity of the adsorbent, performance etc.). Such information is crucial to determine the overall efficiency of the process.

- ✓ Thank you for your comment and attention. The procedure, related MATLAB code, separation's impact on the energetic performance, and other required details were provided and added to the manuscript as follows (other related revisions are presented in the next comment responses):

One of the best options for CO2 separation from flue gases is temperature swing adsorption (TSA), which uses a solid adsorbent like zeolite 13x and has been applied for the present study. There are some

advantages to it, such as high CO2 adsorption capacity and selectivity under flue gas conditions, regeneration achieved by simple heating instead of pressure cycles, thermal swing providing a strong driving force for desorption, relatively low energy needs for the process, and a widely proven adsorbent with predictable performance. The CO2 adsorption slightly reduces efficiency due to the energy for adsorbent regeneration, but this process has a positive impact on environmental issues. The adsorbent is packed into fixed beds. While one bed adsorbs flue gas CO2, the saturated bed is regenerated by raising the temperature using a hot sweep gas. Multiple beds are cycled to provide continuous operation. TSA gives high-purity CO2 without needing additional displacement gases. The process is also relatively simple to operate. To decrease the temperature of the CO2, a cooling load is needed, which reduces total performance a little but has a significant positive effect on the environment. In this study, the cooling load is provided by an absorbent refrigerant cycle.

```
%%[12]  CO2 separation through temperature swing adsorption
(TSA) method of adsorption
% Constants
R = 8.314; % Universal gas constant [J/(mol K)]

% Adsorption properties
T_ads(month) = T11(month); % Adsorption temperature [K]
P_ads = 1; % Adsorption pressure [bar]

% Desorption properties
T_des = 403; % Desorption temperature [K]
P_des = 5; % Desorption pressure [bar]

% CO2 properties
MW_CO2 = 44.01; % Molecular weight of CO2 [g/mol]
rho_CO2 = 1.977; % Density of CO2 [kg/m^3]

% Brayton cycle properties
m_dot11 = m_dot9; % Flue gas mass flow rate [kg/s]
CO2_fraction = 0.115; % CO2 fraction in the flue gas
E_electricity = 0.10; % Electricity cost [$/kWh]
E_thermal = 0.05; % Thermal energy cost [$/kWh]
```

```
% Calculating required mass of adsorbent
V_dot_gas = m_dot11 / rho_CO2; % Volumetric flow rate of flue
gas [m^3/s]
n_CO2 = V_dot_gas * CO2_fraction / (R/1000 * T_ads(month)); %
Moles of CO2 in the flue gas [mol]

% Mass of adsorbent required
mass_adsorbent = n_CO2 * MW_CO2; % [g]

% Adsorption cycle
Q_ads = mass_adsorbent * E_thermal; % Thermal energy required
for adsorption [kWh]
E_ads = Q_ads * E_electricity; % Electrical energy required for
adsorption [kWh]

% Desorption cycle
Q_des = mass_adsorbent * E_thermal; % Thermal energy required
for desorption [kWh]
E_des = Q_des * E_electricity; % Electrical energy required for
desorption [kWh]

% Total energy and cost
E_total = E_ads + E_des; % Total energy required [kWh]
Cost_total = E_total * (E_electricity + E_thermal); % Total cost
[$]
```

--> "For the efficiency of the entire system I think there are 3 issues, which were not properly addressed in the study: (i) the combustion was assumed to be adiabatic, although an efficiency of 90% was introduced (see Table 5), (ii) the effect of the catalytic converter on the efficiency and (iii) the CO2 separation process at point 13." Here, the same comment as given in the issue above for the adsorbent. No information about the catalyst and its efficiency is provided. Thus, it is hard to determine how the catalyst will affect the overall efficiency of the process. It was stated in the manuscript that it was not the intention to investigate different catalysts/adsorbents in detail, but the authors should choose one type and provide sufficient data for the adsorbent and catalyst.

✓ Thank you very much for your comment. All mentioned sections have been revised as follows:

i) The combustion chamber revised as a non-adiabatic and its impact on efficiencies are applied as follows (as shown, total efficiencies have decreased slightly):

The combustion chamber lasts heat through radiation and convection mechanisms. Non-adiabatic combustion decreases efficiency due to heat loss from the combustor. Thus, it is not adiabatic, and modeling it as non-adiabatic as follows, which is also presented in Error: Reference source not found:

$$Q_{loss} = Q_{conv} + Q_{rad}$$

The convective heat transfer rate can be calculated using Newton's law of cooling:

$$Q_{conv} = h \times A \times (T_s - T_{inf})$$

Where, Q_{conv} is the convective heat transfer rate (in watts), h is the convective heat transfer coefficient, A is the surface area through which heat is transferred, T_s is the surface temperature of the combustion chamber, and T_{inf} is the temperature of the surrounding fluid.

The radiative heat transfer rate can be calculated using the Stefan-Boltzmann law:

$$Q_{rad} = \varepsilon \times \sigma \times A \times (T_s^4 - T_{sur}^4)$$

Where Q_{rad} is the radiative heat transfer rate (in watts), ε is the emissivity of the combustion chamber surface, σ is the Stefan-Boltzmann constant, and A is the surface area of the combustion chamber.

```
%% Non-adiabatic Combustion Chamber Model
%[6]
m_dot6=m_dot1+m_dot5;
P6=P4;

% Constants
h = 100; % Convective heat transfer coefficient (W/m^2.K)
```

```
epsilon = 0.8; % Emissivity of the combustion chamber surface
sigma = 5.67e-8; % Stefan-Boltzmann constant (W/m^2.K^4)

% Combustion chamber properties
A = 12; % Surface area (m^2)
T_s = 1000; % Surface temperature (K)

% Surrounding fluid properties
T_inf = 300; % Surrounding fluid temperature (K)

% Calculate convective heat transfer
Q_conv = h * A * (T_s - T_inf);

% Calculate radiative heat transfer
Q_rad = epsilon * sigma * A * (T_s^4 - T_inf^4);

% Energy balance equation
% Q_in = 1000; % Total heat input to the combustion chamber (W)
Q_out = (Q_conv + Q_rad)/1000; % Total heat output from the
combustion chamber (W)


% Calculate the heat release rate from fuel combustion
% Q_fuel = Q_in - Q_out - m_dot * (h_in - h_out);


h6_balance(month)=1/(m_dot6)*(m_dot1*h4(month)+m_dot5*LHV_fuel-
Q_out)*etha_cc;
```

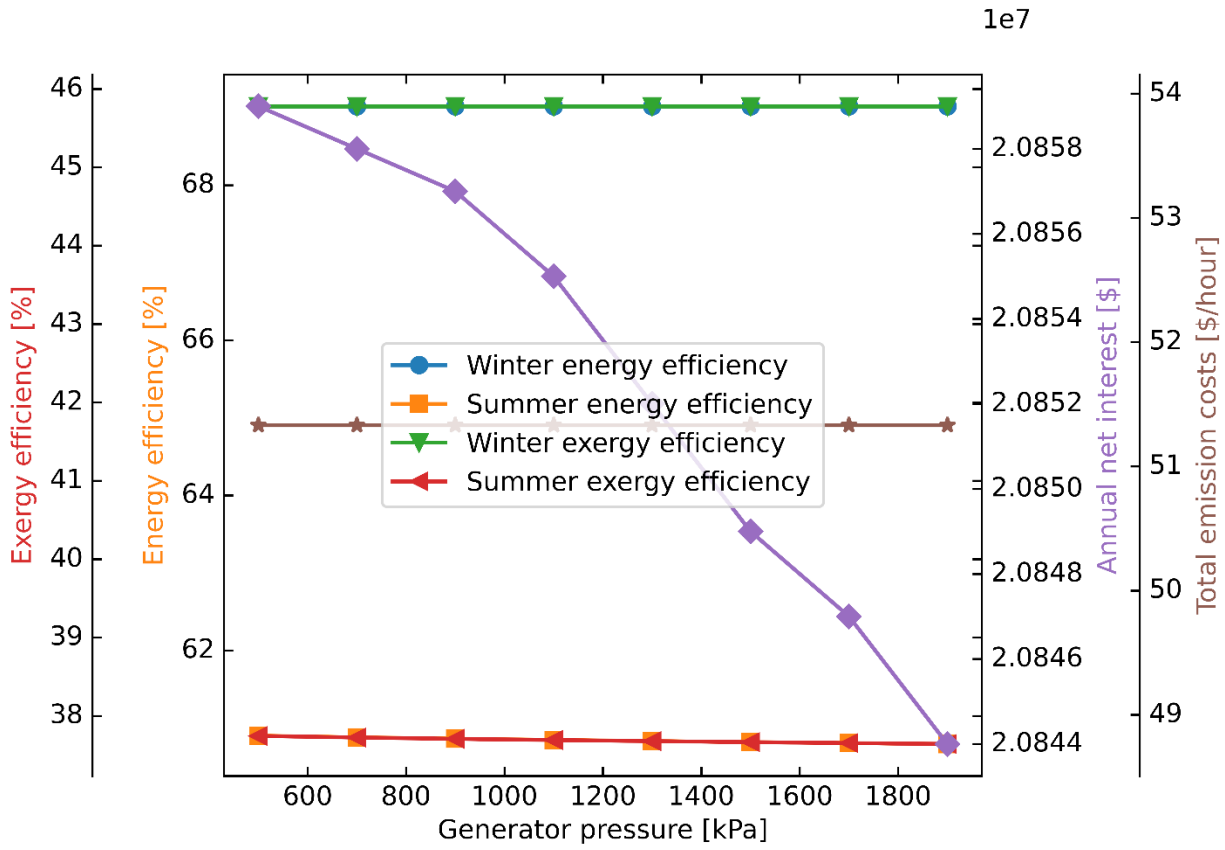

Figure 1: The variation of generator pressure on the objective functions

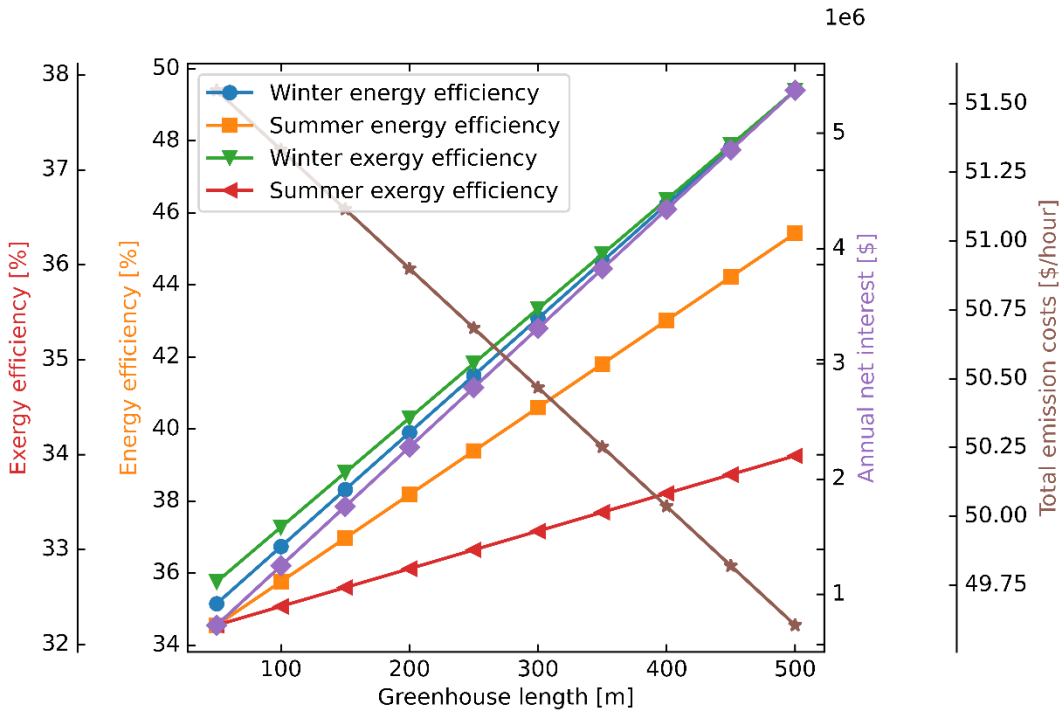

Figure 2: The variation of greenhouse length on the objective functions

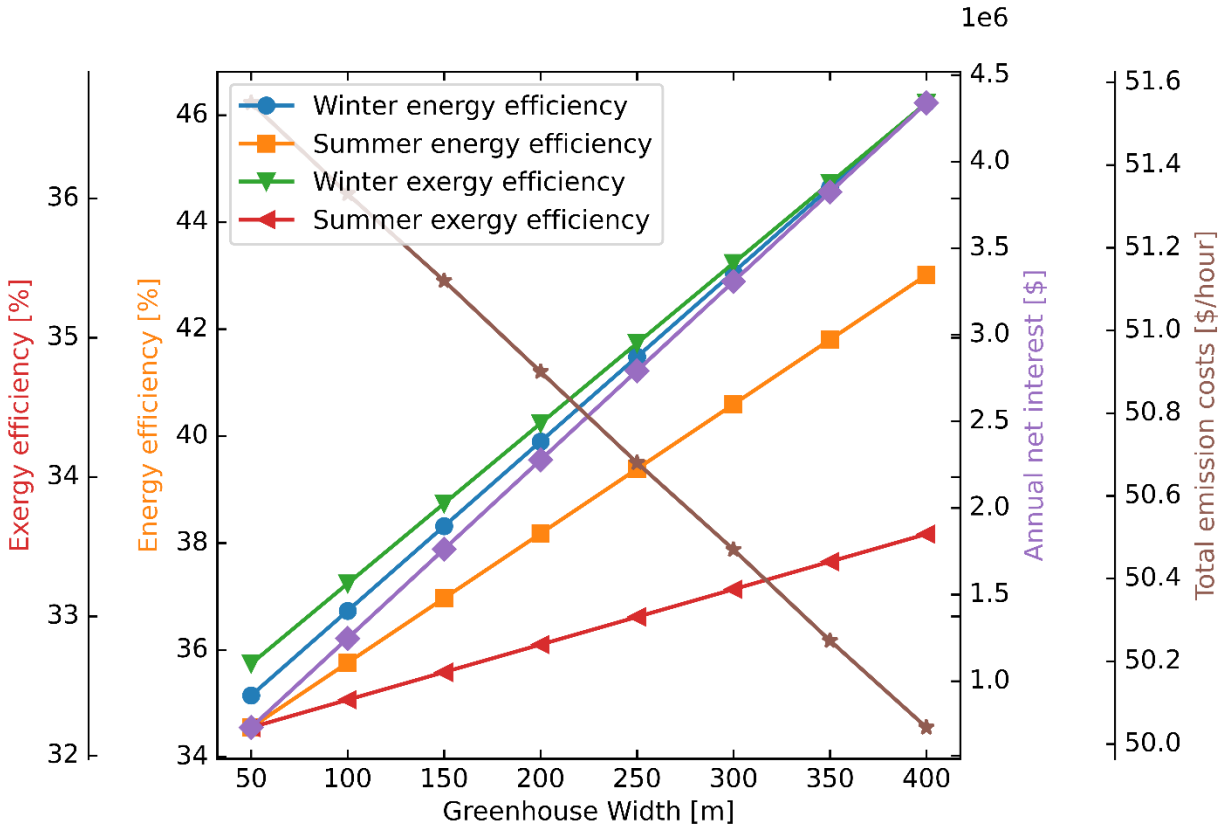

Figure 3: The variation of greenhouse width on the objective functions

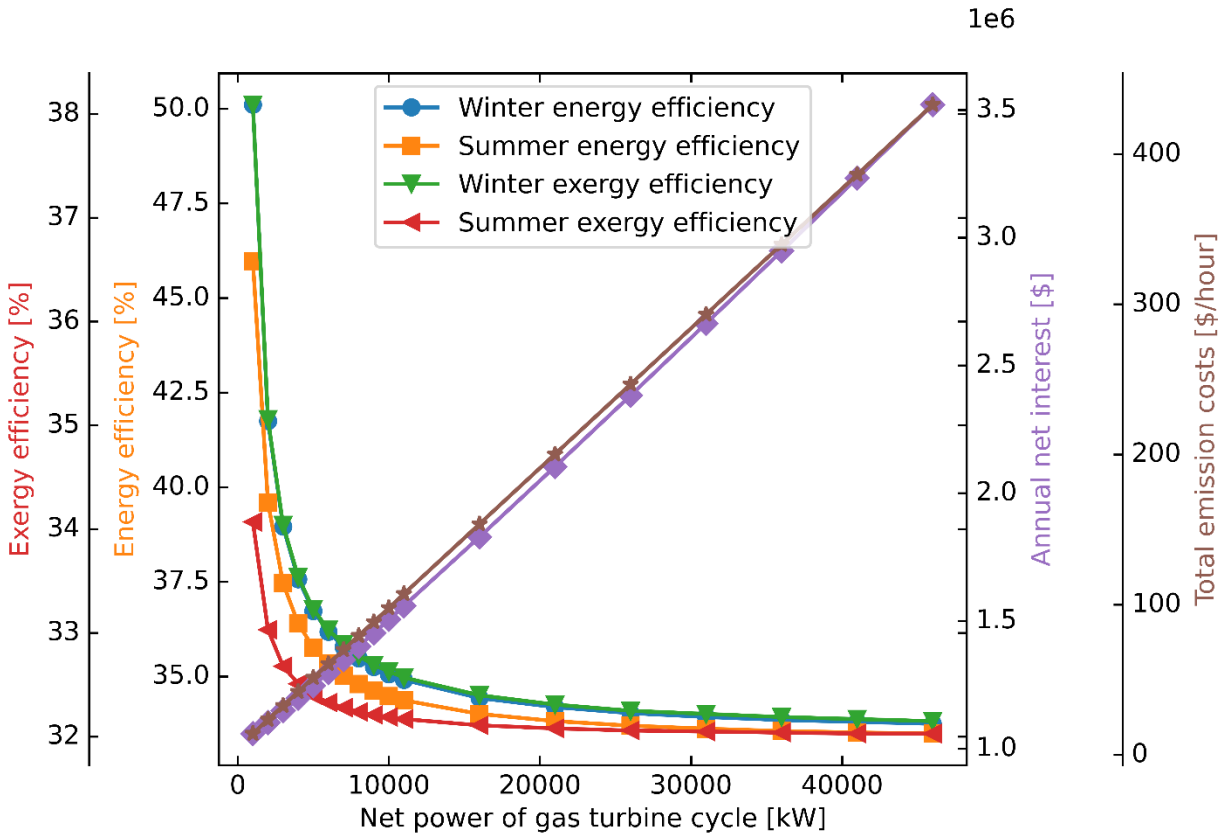

Figure 4: The variation of net gas turbine power on the objective functions

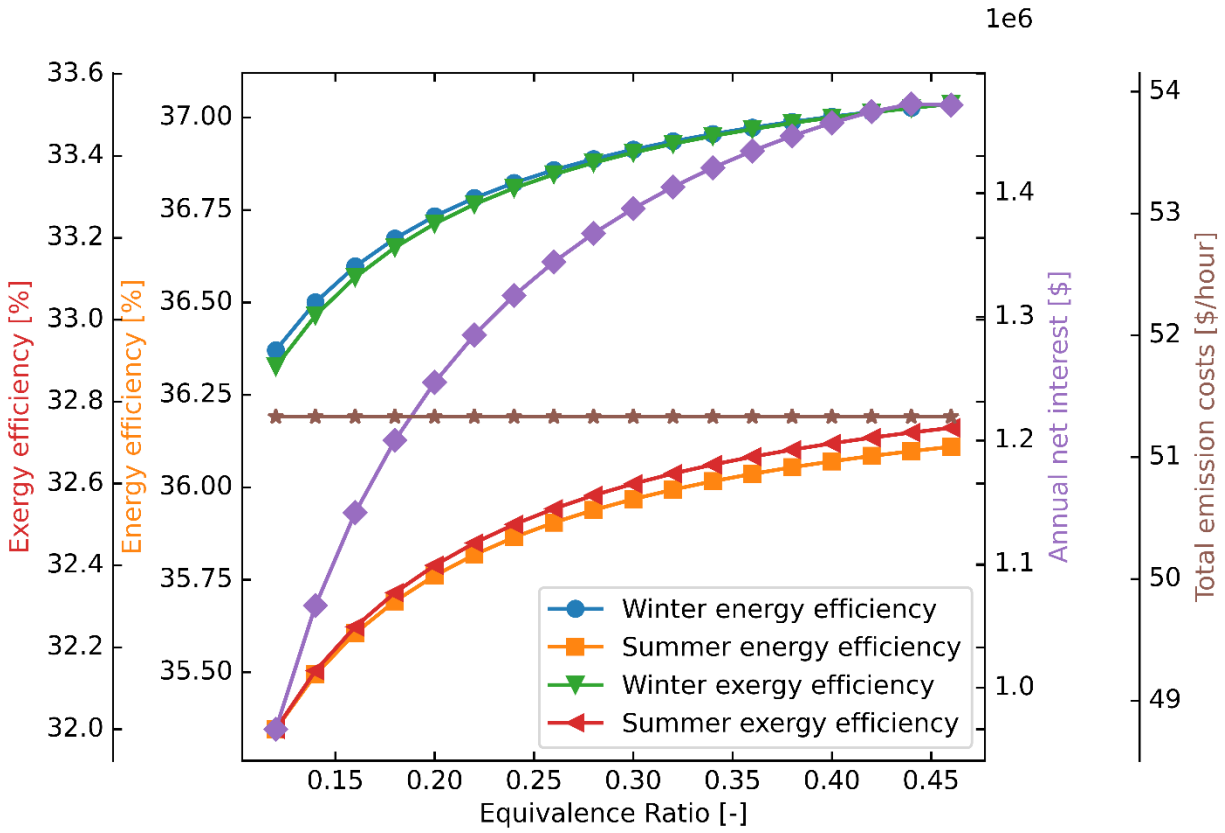

Figure 5: The variation of equivalence ratio on the objective functions and system

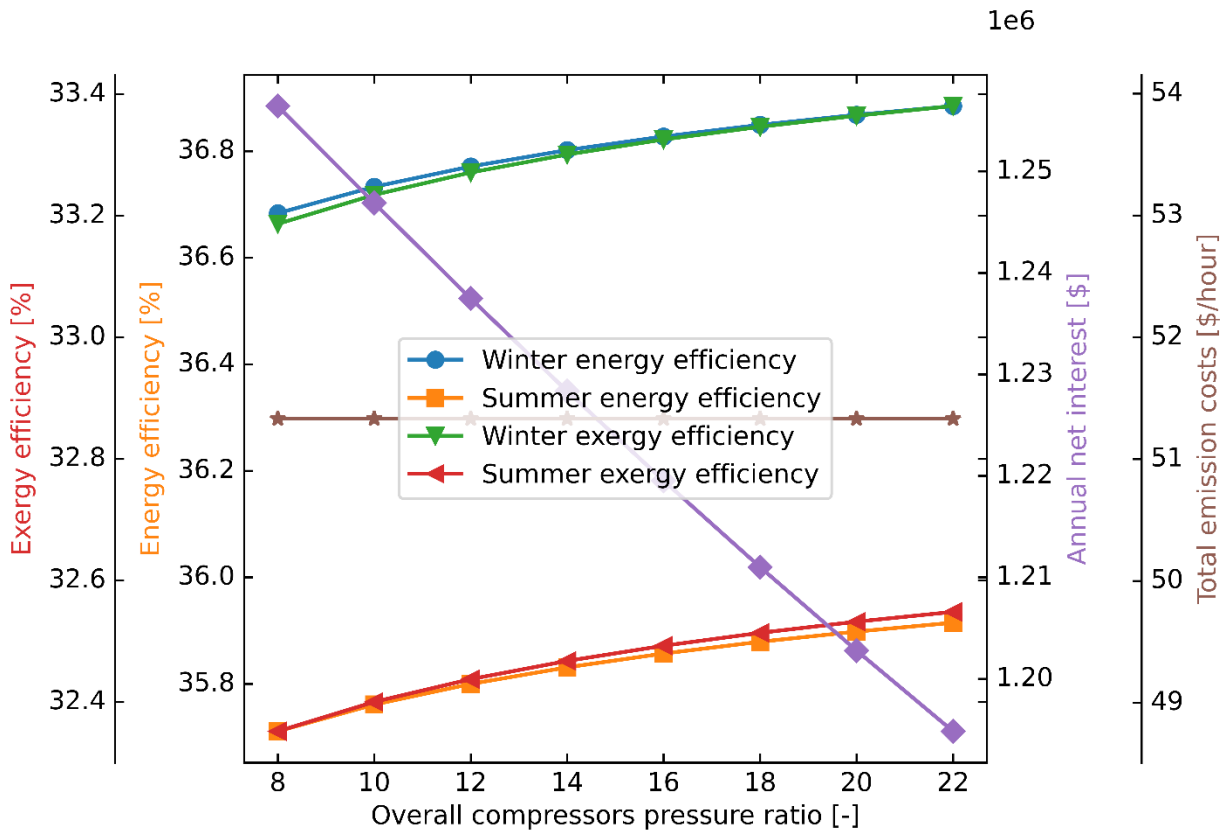

Figure 6: The variation of pressure ratio of compressors on the objective functions and system

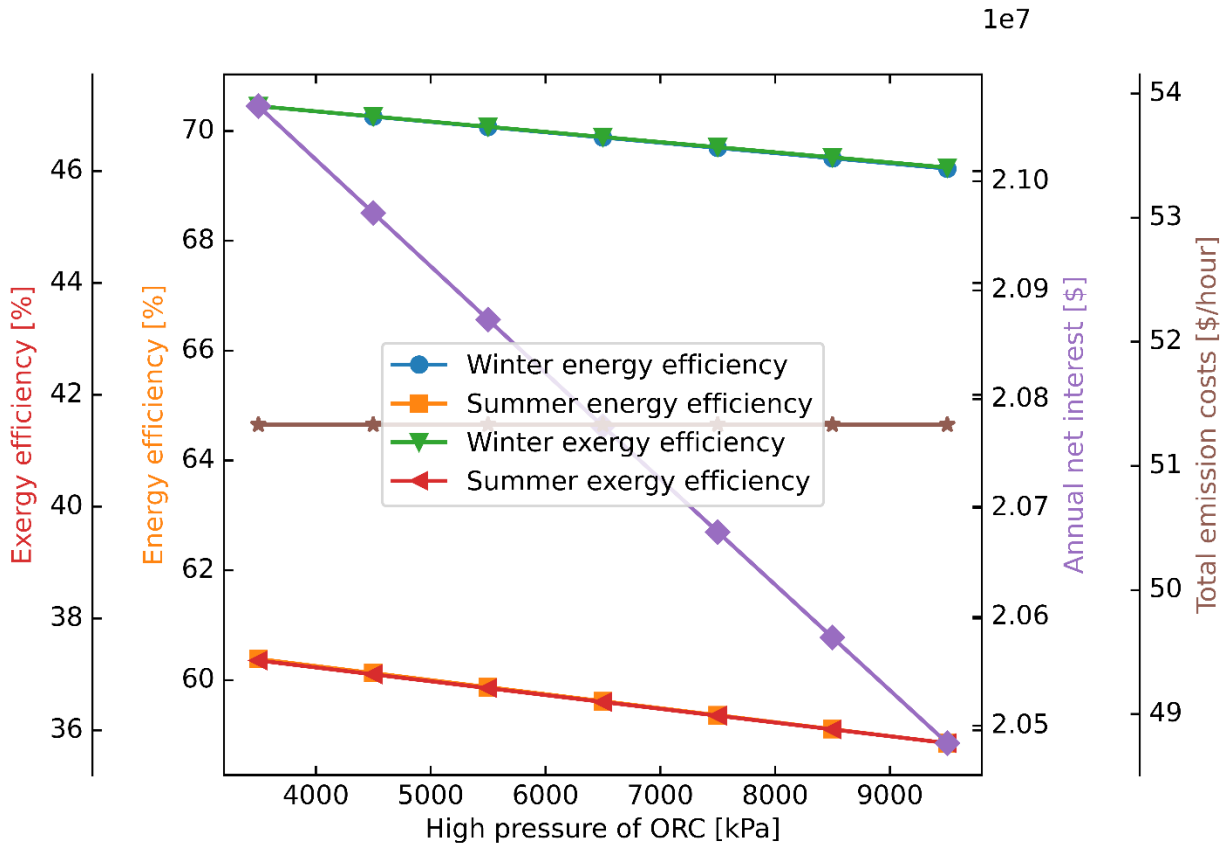

Figure 7: : The variation of high pressure of ORC on the objective functions and system

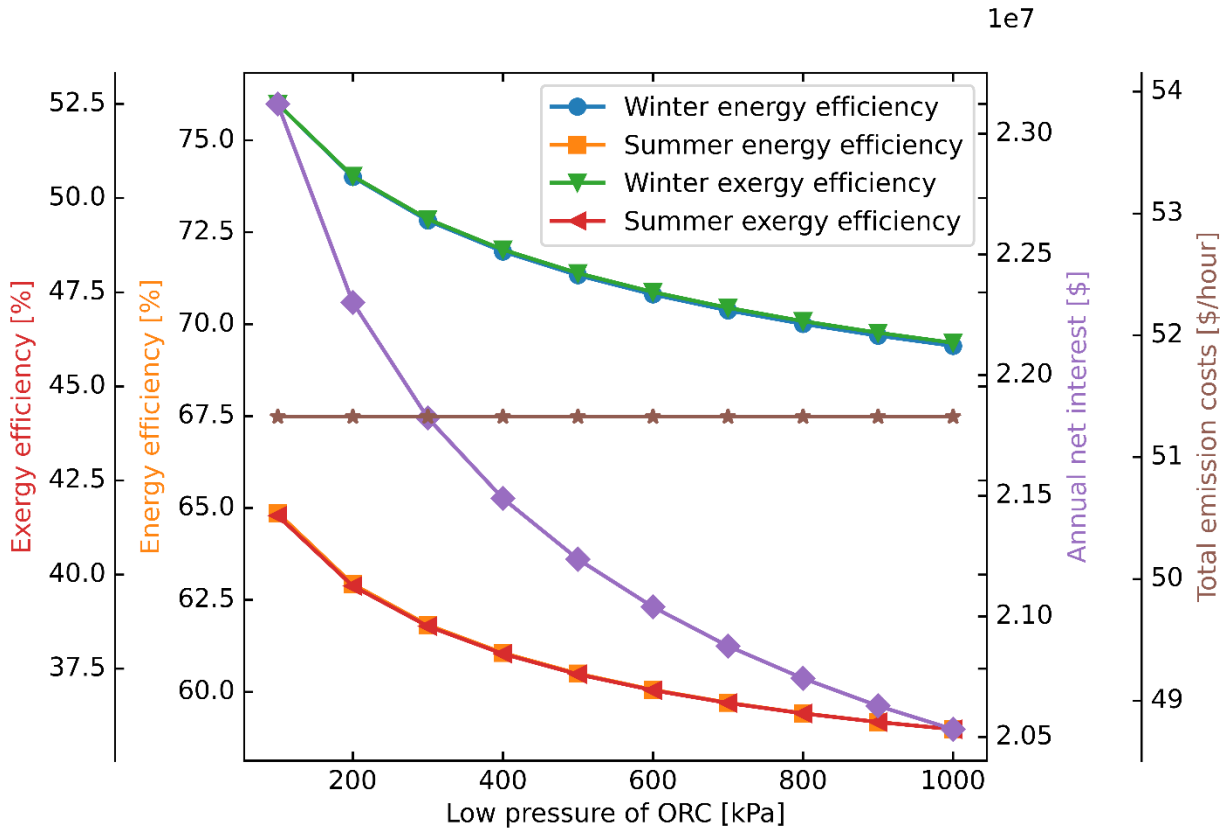

Figure 8: The variation of low pressure of ORC on the objective functions and system

Table 1: Major outputs of the system prior to and following optimization, together with their improved percentage

Main parameters	After optimization	Before optimization	Improvement (%)
Power of the Organic Rankine cycle (kW)	2251.2	969	132
Total Energy efficiency (%)	49.2	45.3	8.6
Total Exergy efficiency (%)	36.71	31.6	16
Total Annual net interest ($)	22,522,356	18,498,671.9	21.8

ii) The modeling and programming code of the oxidation catalytic converter were revised and added to the manuscript as follows:

Oxidation catalysts are utilized to convert carbon monoxide and unburned hydrocarbons into carbon dioxide and water. The present study utilizes this kind of catalyst. Precious metals like platinum, palladium, and others create sites that facilitate combustion reactions. Diesel engine exhaust systems often employ oxidation catalysts since diesel combustion generates amounts of nitrogen oxides (NOx). Here is a description of modeling an oxidation catalyst:

$$CO+\frac{1}{2}O_2 \rightarrow CO_2$$

$$C_xH_y+(x+y/4)O_2 \rightarrow xCO_2+(y/2)H_2O$$

The reaction rates can be expressed as power law functions based on partial pressures:

$$rCO=kCO\cdot PCO^m\cdot PO_2^n$$

$$rHC=kHC\cdot PHC^p\cdot PO_2^q$$

Where k is the temperature-dependent rate constant, and m, n, p, and q are the reaction orders determined empirically.

The component molar flow rates are balanced between the inlet and outlet:

$$FCO,\in+rCO\cdot Wcat=FCO,out$$

$$FHC,\in+rHC\cdot Wcat=FCO_2,out+FH_2O,out$$

Where W_{cat} is the catalyst mass, and F is the molar flow rate.

The conversion efficiency for each pollutant is:

$$XCO=(FCO,\in -FCO,out)/FCO,\in ¿$$

$$XHC=(FHC,\in -FHC,out)/FHC,\in ¿$$

The model uses the kinetic rate expressions within the component mass balances to predict the CO and HC conversion across the catalyst. The rates depend on temperature, pressure, and reactant concentrations in the exhaust stream.

```
% Catalytic convertor
% Model parameters
R = 8.314; % Universal gas constant (J/mol/K)
T_in = T7(month); % Inlet temperature (K)
p_in = P6*1000; % Inlet pressure (Pa)
cin = [0.1 0.05 0.02 0.8 0.01 0.02]; % Inlet gas molar
concentrations (O2, CO, NO, N2, CO2, H2O)

% Catalytic converter parameters
x_CO = 0.9; % CO conversion fraction
x_NO = 0.8; % NO conversion fraction

% Calculate inlet gas properties
n_in = sum(cin); % Total inlet mole number (kmol)
MW = [32 28 30 28 44 18]; % Molecular weights (g/mol)
% m_in = n_in.*MW.*cin; % Inlet mass flow rates (kg/s)
m_in =m_dot7;  %(kg/s)
% h_in = m_in.*cp(T_in); % Inlet enthalpy flow (W)
h_in =h7(month)*1000; %(W)
% s_in = m_in.*s(T_in,p_in); % Inlet entropy flow (J/K)
s_in =s7(month)*1000; %(J/K)

% Model chemistry
r1 = @(T,p) k1(T)*p.^2; % 2CO + O2 -> 2CO2
r2 = @(T,p) k2(T)*p;   % 2NO + 2CO -> N2 + 2CO2

% Calculate outlet composition
```

```
cout = cin;
cout(2) = cout(2)*(1-x_CO);  % Deplete CO
cout(4) = cout(4) + x_NO*cout(3); % Form N2
cout(3) = cout(3)*(1-x_NO); % Deplete NO
cout = cout/sum(cout); % Normalize

% Calculate outlet conditions
n_out = n_in;
MW = [32 28 30 28 44 18];
m_out = n_out.*MW.*cout;
h_out = m_out.*h7(month)*1000;
% s_out = m_out.*s7(month)*1000;

% Calculate efficiency
eta_cataletic = (h_out - h_in)/h_in;


% Operating conditions
% T_in = 800; % Inlet temp (K)
% p_in = 101325; % Inlet pressure (Pa)
mdot = m_dot7; % Exhaust mass flow rate (kg/s)
cin = [0.1 0.05 0.02 0.8 0.01 0.02]; % Inlet composition (O2,
CO, NO, N2, CO2, H2O)

% Catalytic converter design
L = 5; % Length (m)
D = 2; % Diameter (m)
rho_bed = 500; % Catalyst bed density (kg/m3)
cp_bed = 950; % Avg heat capacity (J/kg-K)

% Catalyst properties
dh_rxn = -5e5; % Heat of reaction (J/mol)
r_CO = 0.9; % CO conversion fraction
r_NO = 0.8; % NO conversion fraction
MW_Q = [44 30]; % Molecular weights (g/mol)

% Calculate energy for reactions
n_in = mdot./MW_Q; % Inlet molar flow rates (kmol/s)
rCO = n_in(1)*r_CO; % CO reaction rate (kmol/s)
rNO = n_in(2).*r_NO; % NO reaction rate (kmol/s)
Qdot_rxn = -(rCO*dh_rxn(1) + rNO*dh_rxn(1)); % Heat of reaction
(W)

% Calculate heat capacity of converter
m_bed = rho_bed*pi/4*D^2*L; % Catalyst bed mass (kg)
```

```
Q_heat = m_bed*cp_bed*(T_in - 297); % Heat to warm up catalyst
(J)

% Total energy requirement
Energy_total_catalytic = Qdot_rxn/1000;  %  [kj]
```

(iii) All details about CO2 separation are provided in the previous comment response.

Reviewer #2:

Despite the fact that author greatly improved the quality of the manuscript and revised it for typographic and grammatical errors, it still suffers from these type of errors. I highly recommend the author thoroughly review the revised manuscript and resolve these issues. Furthermore, based on the author's response to my questions, the manuscript seems to be more keen toward simulation (in a simplified which is far from practical considerations) analysis.

- ✓ Thank you very much for your comment and attention.
- ✓ We checked the manuscript again and revised the unclear sentences and syntax errors. Some of these selected cases are as follows:

hence, researching several multigenerational systems with diverse configurations is essential in terms of energy, efficiency, and economics.

The energy and exergy studies of each component in such systems are strongly advised to shed additional light on the subject. Calculating the heat transfer of heat exchangers between the energy production unit and the absorption refrigerant cycle or between the gas engine and the greenhouse atmosphere has a significant impact on the development of the model.

Most academics try to use techniques to absorb pollutants like carbon dioxide and methane generated in this setting [1].

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According to the effects of renewable energy, natural gas is the most environmentally friendly fossil fuel

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In such a system, energy and cost analyses are done while simulating a molten carbonate fuel cell.

In this context, an integrated system with a carbon dioxide extract and storage unit, an Organic Rankine Cycle, and a chiller cycle may be evaluated from the standpoints of energy, efficiency, the economy, and the environment

Additionally, phycocapture, which may be considered a carbon sink in metropolitan areas, is a unique way to reduce or capture carbon dioxide because greenhouse gases like carbon dioxide might profoundly affect many aspects of human existence

The system, illustrated in Error: Reference source not found consists of a Brayton cycle, an Organic Rankine cycle, a greenhouse, an air conditioning system and chiller cycle, and will be evaluated as part of the project.

So, by supplying the necessary standard carbon dioxide, the suggested method has the potential to lower air pollution and enhance greenhouse products. Watermelon and tomatoes are two of the plants planted in the greenhouse.

As a result, the expelled exhaust at point 10 transfers to a different heat exchanger, where it heats the Organic Rankine cycle fluid before leaving at point 11.

The gases resulting from combustion have a high temperature, their pressure is low, and the concentration of carbon dioxide is low.

The adsorption process can lower the energy and financial costs associated with CO2 separation from the flue. Generally, the CO2 adsorbent has to be highly selective, have a large adsorption capacity, have acceptable

adsorption or desorption kinetics, and have strong thermal and mechanical stability.

Then exits a liquid expansion valve, and until it reaches point 27, its enthalpy and pressure are decreasing. The refrigerant enters point 23 as a saturated liquid after passing through a heat exchanger to condense and descend its energy.

Thus, a backup light source from an artificial source, such as LED lighting, should be considered.

A greenhouse's lighting system must be designed economically. Each lamp's optimum illuminating area for optimal plant development is noted on the packaging as A_{lamp} [53].

The following equation yields an evaluation of carbon dioxide capture from gas engines or decreased carbon dioxide in the environment:

On the other hand, scaling the data does not always lead to perfect precision, and during the scaling process, mistakes might be made due to several sequences and details.

The influence of greenhouse length on the model functions was assessed and is depicted in Figure 2 since the construction of the greenhouse and its dimensions are among the primary goals of the current article.

Since greenhouse production is taken into account while calculating yearly income since more items would be produced yearly with a larger greenhouse, the annual interest would be more than the costs and the annual net interest would rise as the greenhouse's length increased.

When the compression ratio is at a high level, the output power needed by the gas turbine will grow, and when it is low, the output power of the GT will drop.

Error: Reference source not found also includes the quantity of inputs, the relevant ranges, and the justification for every solution variable restriction.

In addition to benefiting greenhouse goods and cleaning the environment, using greenhouses to absorb carbon dioxide also generates economic benefits due to the release of penalties.

- ✓ In order to satisfy the practical issue, the investigation of the catalytic converter, CO2 separation, non-adiabatic combustion chamber, etc., was performed using programming codes and their impact on efficiencies and system performance. Some of these selected cases are as follows (these issues were responded to with other prior and following comments):

I think catalytic converter (even in a sequential manner) are not able to completely remove the pollutant and keep the CO2 as the only component in their outlet which is fed to the greenhouse, but it seems that the author does not want to take into account the effects of these pollutant.

- ✓ Thank you very much for your comment. In order to modify the mentioned issue, the following programming codes are provided to include the other pollutants: Furthermore, all plots and related results were revised as follows (after revision, the total emission costs increased due to considering NOx, CO, etc.):

```
line 393:
carbonPrice = 0.1; % Price per unit of CO2 emission (e.g.,
$/kgCO2)
Cost_Of_CO2_12=m_dot12_CO2*carbonPrice; %[$/s]

cost_Nox = 6;  % Cost of NOx emission in $/kg
cost_CO = 1;   % Cost of CO emission in $/kg

emission_cost_Nox = cost_Nox * 0.2*50e-6*m_dot12; %[$/s]
0.1:percent of passed No        NOx concentration = 50 ppm=50e-6

emission_cost_CO = cost_CO * 0.2*100e-6*m_dot12; %[$/s]
0.1:percent of passed Co       CO concentration = 100 ppm=100e-6

Total_Emission_costs=Cost_Of_CO2_12+emission_cost_Nox+emission_c
ost_CO;
```

CO2 emissions contribute to climate change and its associated impacts and damages. In addition, CO and NOx emissions cause direct

health impacts and environmental damage on local and regional scales.

Table 2: Emission costs

	Pollutant	Cost (USD/kg)
From climate change	CO2	0.05 - 0.1
Health and environmental	CO	1 - 11
Health and environmental	NOx	5 - 14

The author's response to my question about why he used deep neural network without testing conventional neural forward networks is not sound and rationale mainly due to the fact that:

Decreasing the learning rate and momentum for training the neural network for a network with one or at most two hidden layers resolves all the issues that the author mentioned (if there is any of them). Furthermore, the question was whether the authors went through conventional neural networks and did not come up with appropriate network or not, apart from all the potential vulnerabilities mentioned by respected author (which is rarely happening for networks with number of inputs and outputs of this problem), one of the great short coming of deep neural networks are their large number of parameters which leads to over-training and poor neural network generalizability which are not covered by the author at all.

- ✓ Thank you for your comment. The mentioned concern is addressed as follows in the manuscript:
  The training process utilized traditional neural networks but failed to produce a suitable network. Applying the deep neural network causes less pre-processing of data because the data vary over a large range. However, one of the significant

limitations of deep neural networks is their extensive parameterization, which can result in over-training and limited generalization generalizability.

Reviewer #3: The authors have effectively improved the quality of the manuscript but there are still some points to clarify:

- Paper style still shows a limited English proficiency. At this point this is considered unacceptable.

- ✓ Thank you very much for your comment and attention.
- ✓ We checked the manuscript again and revised the unclear sentences and syntax errors. Some of these selected cases are as follows:

hence, researching several multigenerational systems with diverse configurations is essential in terms of energy, efficiency, and economics.

The energy and exergy studies of each component in such systems are strongly advised to shed additional light on the subject. Calculating the heat transfer of heat exchangers between the energy production unit and the absorption refrigerant cycle or between the gas engine and the greenhouse atmosphere has a significant impact on the development of the model.

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Consequently, both the lightning process and other system components should be represented

In such a system, energy and cost analyses are done while simulating a molten carbonate fuel cell.

In this context, an integrated system with a carbon dioxide extract and storage unit, an Organic Rankine Cycle, and a chiller cycle may be evaluated from the standpoints of energy, efficiency, the economy, and the environment

Additionally, phycocapture, which may be considered a carbon sink in metropolitan areas, is a unique way to reduce or capture carbon dioxide because greenhouse gases like carbon dioxide might profoundly affect many aspects of human existence

The system, illustrated in Error: Reference source not found consists of a Brayton cycle, an Organic Rankine cycle, a greenhouse, an air conditioning system and chiller cycle, and will be evaluated as part of the project.

So, by supplying the necessary standard carbon dioxide, the suggested method has the potential to lower air pollution and enhance greenhouse products. Watermelon and tomatoes are two of the plants planted in the greenhouse.

As a result, the expelled exhaust at point 10 transfers to a different heat exchanger, where it heats the Organic Rankine cycle fluid before leaving at point 11.

The gases resulting from combustion have a high temperature, their pressure is low, and the concentration of carbon dioxide is low.

The adsorption process can lower the energy and financial costs associated with CO2 separation from the flue. Generally, the CO2 adsorbent has to be highly selective, have a large adsorption capacity, have acceptable adsorption or desorption kinetics, and have strong thermal and mechanical stability.

Then exits a liquid expansion valve, and until it reaches point 27, its enthalpy and pressure are decreasing. The refrigerant enters point 23 as a saturated liquid after passing through a heat exchanger to condense and descend its energy.

Thus, a backup light source from an artificial source, such as LED lighting, should be considered.

A greenhouse's lighting system must be designed economically. Each

lamp's optimum illuminating area for optimal plant development is noted on the packaging as A_{lamp} [53].

The following equation yields an evaluation of carbon dioxide capture from gas engines or decreased carbon dioxide in the environment:

On the other hand, scaling the data does not always lead to perfect precision, and during the scaling process, mistakes might be made due to several sequences and details.

The influence of greenhouse length on the model functions was assessed and is depicted in Figure 2 since the construction of the greenhouse and its dimensions are among the primary goals of the current article.

Since greenhouse production is taken into account while calculating yearly income since more items would be produced yearly with a larger greenhouse, the annual interest would be more than the costs and the annual net interest would rise as the greenhouse's length increased.

When the compression ratio is at a high level, the output power needed by the gas turbine will grow, and when it is low, the output power of the GT will drop.

Error: Reference source not found also includes the quantity of inputs, the relevant ranges, and the justification for every solution variable restriction.

In addition to benefiting greenhouse goods and cleaning the environment, using greenhouses to absorb carbon dioxide also generates economic benefits due to the release of penalties.

- The highlights section is not improved yet. For instance, some numerical results need to be included.

✓ Thank you for your comment. The highlights are revised as follows based on your comment:

- ✓ Preventing release of 0.5083 kg CO2/s into the environment by absorbing it in a greenhouse
- ✓ Using a deep learning model of the system decreases optimization time by up to 257 times
- ✓ Using excessive energies in the system for greenhouse and optimization increases efficiencies by almost 10 percent and total interest

- The reviewer comment " The ORC would need higher temperature than the Absorption chiller, so their position in the PFD should be inverted." is not properly addressed in the review of the paper.

✓ Thank you for your comment. The reasons and explanations were revised as follows:

In addition, one of the most important objectives of the presented study is CO2 capture. Thus, despite the fact that the ORC would need a higher temperature than the absorption chiller, providing cooling and heating energies and other conditions for the greenhouse are priorities to capture CO2. For the greenhouse to always produce crops at optimum conditions and consume CO2 to clear the environment, it should provide various types of energy, air conditioning, and all other requirements for various conditions. For these reasons, it was decided to adjust the priority for the greenhouse.

- The correlation for the ORC turbine design efficiency can be retrieved from the source "Macchi, Ennio, and Marco Astolfi, eds. Organic rankine cycle (ORC) power systems: technologies and applications. Woodhead Publishing, 2016.".

✓ Thank you for your comment. Based on your comment, the programming codes of the correlation for the ORC turbine design efficiency were generated, and all related content and results were revised with the other revisions, which were presented comprehensively in previous responses.

```
%% The turbine efficiency based on the empirical correlation
proposed by Macchi and Astolfi
% Inputs
TIT(month) = T30(month); % Turbine inlet temperature [K]
TIT_design = 1500; % Design turbine inlet temperature [K]
```

```
C1 = 0.89;
C2 = 0.11;
C3 = -0.18;

% Calculate turbine inlet temperature ratio
TIT_ratio(month) = TIT(month)/TIT_design;

% Calculate turbine efficiency
eta_t_ORC(month) = C1 - C2*(TIT_ratio(month)).^C3;

h31(month)=h30-(h30-h31_s)./eta_t_ORC(month);
```

The empirical correlation proposed by Macchi and Astolfi provides an estimate of the turbine efficiency in a Brayton cycle based on specific parameters. Here is the formula for turbine efficiency [48]:

$$\eta_{turb} = a + b*(T_{hot} - T_{cold}) + c*(T_{hot} - T_{cold})^2 + d*(P_{hot} - P_{cold})$$

Where T_{hot} is the temperature of the hot gases at the turbine inlet (in Kelvin), T_{cold} is the temperature of the cold gases at the turbine outlet, P_{hot} is the pressure of the hot gases at the turbine inlet (in bar or absolute pressure units), P_{cold} is the pressure of the cold gases at the turbine outlet (in bar or absolute pressure units) a, b, c, and d are coefficients determined empirically based on the specific turbine design and operating conditions.

- Thank you very much again for your feedback.